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ABSTRACT

Rostrum is a very important part of any ceremony especially a formal ceremony. It is used to attract attention of the ceremony to the speaker. It is also used to instil confidence in first time speakers. The rostrum is an international item for ceremonies yet most of it has a fixed height. As it is known, the international citizens have a variable average height which means the rostrum cannot have a fixed height. This project concentrates on producing a rostrum system for automated height adjustment. The height adjustment allows the speaker to speak comfortably without having to hunch or tiptoe. The system is controlled by a single PIC microcontroller and the driver to rotate the motor in two directions is used to protect the PIC from current feedback. The mechanism used in the rostrum is the lead screw method where the lead screw is attached or welded onto the motor and connected to the rostrum. The rotation clockwise and counter clockwise makes the rostrum move upwards and downwards. The body of the rostrum is made of Poly Methyl Methacrylate Acrylic to make it look unique and attract attention of audience. This rostrum can be used in all situation and functions as it is unique and still fulfils the basic function of the rostrum.

ABSTRAK

Rostrum merupakan sebuah perabot atau alat yang sangat penting untuk menjayakan sebuah majlis, terutamanya majlis formal. Ianya digunakan untuk menarik perhatian orang ramai kepada speaker. Ia juga digunakan untuk memupuk sifat berani bercakap di khalayak ramai pada speaker-speaker muda. *Rostrum* merupakan sebuah alat yang digunakan secara global. Namun, ketinggian kebanyakan *rostrum* adalah tetap. Seperti yang diketahui umum, purata ketinggian manusia diserata dunia adalah jauh berbeza. Maka, *rostrum* yang hendak digunakan secara global tidak boleh mempunyai ketinggian yang tetap. Projek ini menekankan pada penghasilan sebuah sistem khas untuk *rostrum* yang ketinggiannya boleh diubah. *Rostrum* yang mempunyai kelebihan ketinggiannya boleh diubah dapat memudahkan speaker untuk menyampaikan syarahan atau ucapan dengan selesa tanpa perlu membongkok atau terjengket-jengket. Sistem ini dikawal oleh sebuah *PIC Microcontroller*. Sebuah cip *Driver* digunakan untuk membolehkan motor bergerak dua arah, dan untuk melindungi *PIC* dari tindakbalas arus. Mekanisma pergerakan yang digunakan untuk mengubah ketinggian *rostrum* ini adalah kaedah *lead skru* dimana sebatang besi yang berulir dikimpal pada sebuah motor dan ia disambung pada *rostrum.* Pusingan motor mengikut arah jam dan melawan arah jam membolehkan *rostrum* bergerak keatas dan kebawah. Keseluruhan *rostrum* dihasilkan menggunakan *acrylic* bagi tujuan kelihatan unik, dan untuk menarik perhatian orang ramai. *Rostrum* ini boleh digunakan untuk semua jenis majlis kerana walaupun ia kelihatan unik, namun ia masih memenuhi fungsi asas sebuah *rostrum*.

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LIST OF SYMBOLS

Ω	Ohm, Value of resistance
F	Farad, unit of capacitor
μ	Micro, 1 x 10^{-6}
π	Pi, valued at 3.142
ω	Omega, rotation per frequency
T	Torque
p	Pico, 1 x 10^{-12}

LIST OF ABBREVIATIONS

V	Voltage
cm	Centimeter
mm	Milimeter
PIC	Programmable Logic Circuit
A	Ampere
CAD	Computer Aided Design
CAM	Computer Aided Manufacturing

ROSTRUM SYSTEM FOR AUTOMATED HEIGHT ADJUSTMENT

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requirements for the award of the degree
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CHAPTER 1

INTRODUCTION

1.1 Project Motivation

Rostrum according to the Merriam Webster online dictionary means an ancient Roman platform for public orators, a stage for public speaking, or a raised platform on a stage. It has been used by leaders, speakers to convey messages and to speak formally to a crowd. Up to today it is still used and continuously upgraded to keep up with the need of the market. Today, ministers, leaders of nations, political icons, celebrities, and even regular speakers uses rostrums for formal ceremonies such as meetings, award giving ceremonies, political campaigns, and others. In short, even though rostrum is always overlooked as something less than important, it is truly what the world need in the arena of public speaking.

Rostrum has mainly been used to instill confidence in the young children. This is by making them speak at the rostrum which gives them the confidence they need as the rostrum is a good support for new speakers. New speakers usually would have stage fright and would stumble while giving their speech. This can be overcome by using the rostrum to his or her advantage (Joanne Mikola, 2008).

Rostrum is also an effective way to give out information. People would listen to the speaker once the speaker is on the podium. It is a good way to attract attention to convey the message or information. Clearly, the study of rostrum, podium is needed to cope with the ever-growing demand of the market.

1.2 Project Background

The rostrum in the market today has many flaws that can be considered when doing research. The major problems or disadvantages in the current rostrum design are heavy and hard to transport, majority rostrum has a fixed height, manually adjustable height of microphone, no pointer on rostrum for presentation, majority rostrum does not have screen display for text/speech, microphone doesn't follow personal movement, there is no wheels on the lower part of rostrum for easy transportation, and the list goes on.

The first problem is the rostrum is heavy and hard to transport due to the rostrum having no wheels. Ordinary rostrums are normally made from oak, pine and wood of good quality. But the negative backlash here is that the rostrum becomes too heavy. So by being heavy and not having any wheels, it creates a problem for moving the rostrum. More man power will be needed to transport the rostrum.

Majority rostrum in the market doesn't have screen display that makes it easier for the speaker to speak without having to see his or her notes. Normally, speakers use cue cards to deliver speeches in a more organize manner. Sometimes the speaker can get lost in the cue card searching for his or her notes. This could create panic and increase stage fright in the speaker. This would ruin the speech. Rostrum with an screen display could solve the problem.

In the market currently majority rostrum does not have a pointer for presentation purposes. This creates a problem when an extra person is needed to navigate the slides. This is an important feature as it can be used for multiple presentations even for paper presentation at a technical conference.

The microphone normally is adjusted manually and it is an extra task for the master of ceremony to manually adjust the rostrum after each speaker. There is also the problem when the speaker moves from side to side but the microphone stays constant. No

feedback happens causes the microphone to be constant. This causes the voice projection of the speaker to be disturbed which limits the movement of the speaker.

The last problem highlighted in this part is concerning the height factor of speakers. Current designs of rostrum are fixed for one height and this creates a problem for speakers who are either too small or too big for the rostrum.

1.3 Project Problem Statement

This project is to solve the height problem as explained earlier. Current design of rostrum in the market shows that the rostrum has a fixed size (based on regular human height) and if it can be adjustable, it will still need manual adjustments or trained personal for the automated adjustment. This is a problem for the master of ceremony as he or she has to adjust it for the speaker if the speaker is not familiar with it. It creates the need of an extra man power.

The rostrum in the market currently has one major problem. The master of ceremony needs to adjust the size of the rostrum every time the speaker changes. This is due to the design in the market is very new and majority of the people doesn't know how to operate the rostrum (if it is the adjustable type). Even if the rostrum uses pneumatics, the master of ceremony still has to adjust the height every time the speaker changes. Even if this design solves the problem for the permanent height of the rostrum, it creates a new kind of problem, additional man power.

The current designs in the market, either the fixed sized rostrum or the adjustable rostrum have not yet completely solve the problem of variable height of speakers successfully.

1.4 Project Objectives

The project objectives are:

a) Design the rostrum with an automatic system using sensors.
b) Assemble the electronic part of the rostrum.
c) Build the mechanical part of the rostrum. (including the rostrum outer surface)
d) Link between the electronic device and mechanical system using software and coding.
e) Assembly the project.

1.5 Project Scopes

The project scopes of this project are:

a) The development of the rostrum is still at a prototype level and is still a new type of product in the automated rostrum field.
b) The rostrum is to be controlled via sensor.
c) This design is only suitable for average sized human from around the world. It is not suitable for abnormality in height.
d) This is the first step in the evolution, many other features can be added on in later research such as remote controlled for the automated system.
e) These problems are not considered in this project:
    - The rostrum is heavy and hard to transport due to having no wheels.
    - The rostrum has no pointer for presentation.
    - The rostrum has no chiller or heater.
    - There is no screen display on the rostrum.
    - The microphone doesn't follow personal movement.
    - The rostrum has no automatic adjustable microphone.
    - The optimization of the motor speed of the automated system.

1.6 Project Report Organization

The rest of the report is organized as follows:

a) Chapter 2: Literature Review and Background Knowledge
   - Understanding the design of former rostrum in the market. This includes the adjustable and non adjustable rostrum, the system used, the mechanism, and others.
   - Compare design and understand the weakness and strength of current design of rostrum in the market.

b) Chapter 3: Design and Methodology
   - Design the rostrum using SolidWorks and find the best design to suit the need to be automated.
   - Understand and manipulate the electronic circuit for the system.
   - The design is shown with explanation on why this design is the optimum design.
   - All data are collected and development process of the design is started followed by the assembly.

c) Chapter 4: Result
   - The rostrum is tested under different set of height.
   - The result of the test is presented.

d) Chapter 5: Project Conclusion
   - Project conclusion and the recommendation for future works are presented.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, there will be explanation on the definition of rostrum, the types of rostrums currently in the market, functions of current design of rostrum, and problem of rostrums.

2.2 Definition of Rostrum

Rostrum is an essential part of formal meeting, public speeches, talks, and ceremonies (The Flower Expert, 2008). It is know with few names such as podium, lectern, or special religious rostrum such as minbar, bimah, and bema (Merriam-Webster, 2008). According to the Merriam Webster Online Dictionary, rostrum is defined as a platform for speakers in the Roman Forum decorated with the beaks of captured ships, an ancient Roman platform for public orators, a stage for public speaking, and a raised platform on a stage.

2.3 Function of Rostrum

Rostrum is a platform on which people stand to deliver speeches. It is not a must to use podiums but most formal ceremonies would opt to use rostrum. It is used as a place for the speaker to stand and give his or her speech. Some speaker uses the podium

to place notes or cue cards for the speech. This helps them to organize what they plan to say better. The rostrum can also be used to ease stage fright.

2.4 Types of Rostrums

There are 2 major types of rostrum in the market. The first one is fixed height rostrum and the second one is adjustable rostrum.

2.4.1 Fixed Rostrums

The fixed type of rostrum is the one regularly found today. It is made with one fixed size. It is regularly made with wood and some are also made from metal and see through acrylic. The price ranges from RM 1000 to as high to RM 13000 for custom made rostrum (Drumshields, 2008).

- **Wood Based**

Figure 2.1 Wood base rostrums
[Taken from ewlBiz, 2008 (the right picture),
RJ Fine WoodWorking, 2008 (the left picture)]

This is the most commonly found rostrum in the market. It has been made using all type off wood such as pine, oak, mahogany and maple. This is cheaper compared to

the other type of rostrums. This kind of rostrums comes in many sizes as can be observed in public halls.

- **Metal Based**

Figure 2.2 Metal based rostrum
[Taken from ewlBiz, 2008]

This is another type of fixed rostrum. It is made normally using light metal such as aluminum, alloys, and other light metals. The usage of this type of rostrum is starting to grow. The number of metal based rostrums is increasing. Some of the design has a surface finish that looks exactly like a wooden based podium.

- **Acrylic Based**

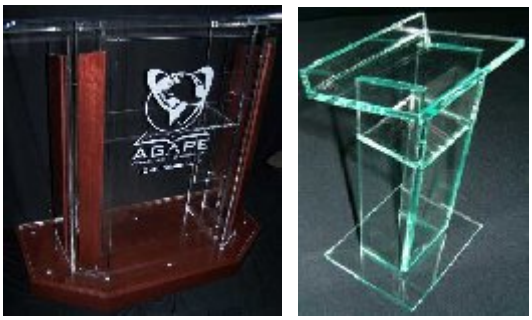

Figure 2.3 Acrylic based rostrum
[Taken from Drumshields, 2008]

This is one of the newest types of material used in making rostrums. It is light weight and looks beautiful as it is see through. It comes in all shapes as can be observed from the picture. One of the designs which are not stated above is the v shaped stand for the podium.

2.4.2 Adjustable Rostrum

The other type of rostrum currently found in the market is the adjustable type. This kind of rostrum is fabricated with a wider range of targeted users. This type of rostrum, even though it is new, can be found in few types.

- **Manually Adjustable Rostrum**

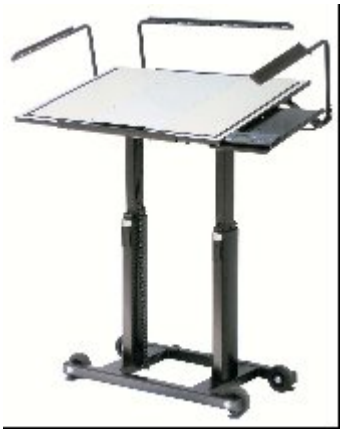

Figure 2.4 Manually adjustable rostrum
[Taken from Ratstands, 2008]

Manually adjustable rostrums are the pioneer design among the adjustable rostrums. It can be adjusted manually by rotating the knob or by changing the location of the pin. The maximum and minimum height of the rostrum is the measure of the capability of the rostrum. This particular rostrum is used by orchestra to place their notes.

- **Automatic Adjustable Rostrum**

Automatic rostrum means a rostrum which is adjusted either using switches, by hydraulic pumps, or other means of mechanism. This type of rostrum is the newest type in the market. It is a new genre in the design of rostrum and it is still at its infant step.

- **Adjustable Using Switch**

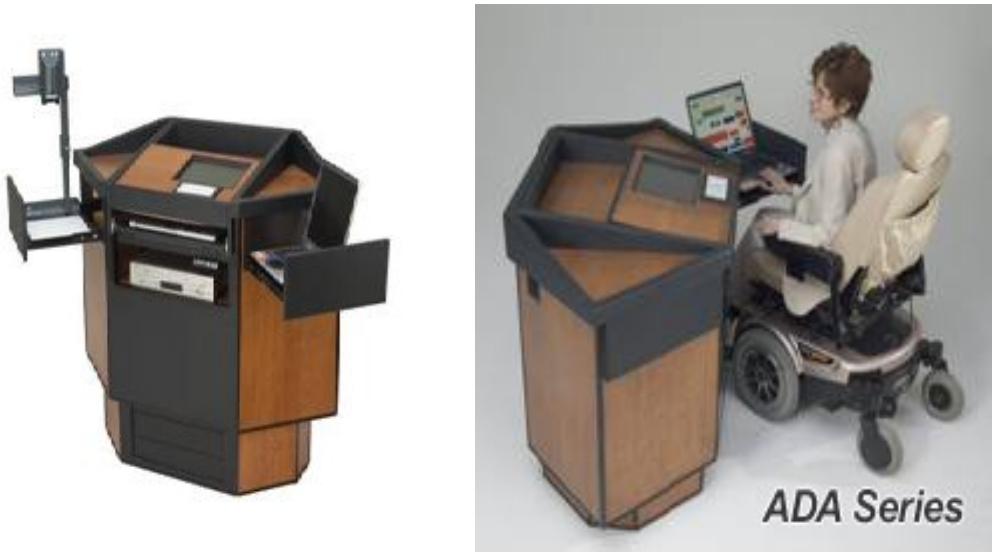

Figure 2.5 Adjustable rostrum using switch
[Taken from Nomadonline, 2008]

This is the automated rostrum which has the capability to change height according to the user need as it is control by a switch on the rostrum. It is one of the leading automated rostrum designs in the market today. This is because it has an all in one system which is simply controlled by one touch screen. It can be adjusted according to height and even suit children and a handicapped person on wheel chair.

- **Adjustable Using Hydraulic Pump**

This is another automated rostrum. The height of the rostrum is controlled by a leg paddle connected to a hydraulic pump. It is currently used for concert where the rostrum moves upward carrying the artist.

Figure 2.6 Adjustable rostrum using hydraulic pump
[Taken from Ratstands, 2008]

2.5 Problem in Current Design of Rostrum

2.5.1 Fixed Height

There are few major flaws in the current design of automated rostrum designs and one of it is fixed height. From the first part of this chapter, it is rather clear that rostrum is used as platform to deliver a speech, give a comment, and commemorate the fallen soldier at war and many more. As the rostrum is being used for many purposes and it is used all around the world (Wikipedia, 2008), an adjustable rostrum should be made. This is because the height of men and women around the world differ a lot between one another especially for those from different origin, background, and even climate from the place they originated. This can be seen in the next sub chapter.